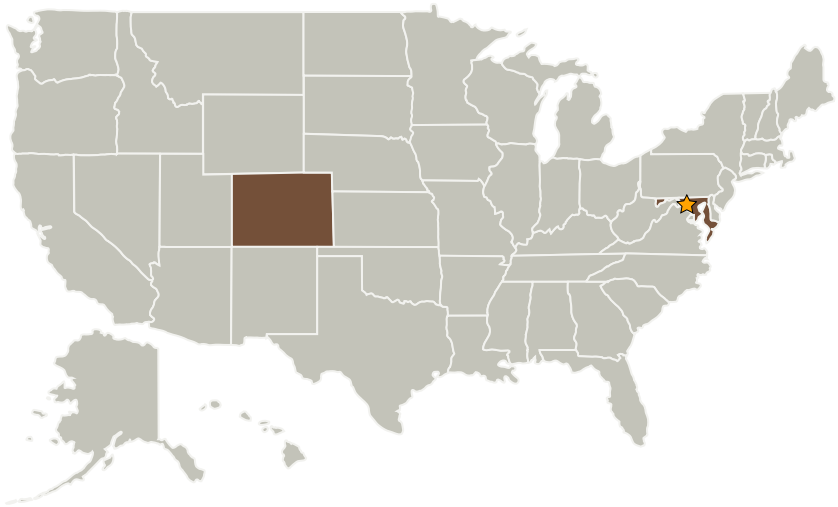
Cloud Micro-sensors for Applications on Small UAVs and Balloons, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

One of the key areas of study of NASA?s Earth Observing System (EOS), a constellation of satellites equipped to remotely measure the earth's surface and atmospheric properties, is the role played by clouds and aerosols in climate change. However, these remote measurements of the size, shape and concentration of cloud and aerosol particles are determined by mathematical inversion of (passive and active) radiative signatures from distances of 700 km. Thus in situ validation of cloud and aerosol properties is essential. The duration of conventional research aircraft is limited, restricting the usefulness of validation measurements. Small uninhabited aerial vehicles (UAVs) and tethered balloons, however, are now capable of making sustained, long-term measurements, so that data sets can be collected that provide much better statistical comparisons with results from satellite retrieval algorithms. In Phase I, we investigate the feasibility of adapting three existing sensors, a hot-wire liquid water content probe, a particle scattering spectrometer probe, and a cloud particle imager (CPI), for use on small UAVs and tethered balloons. In each case, new, innovative technologies are used to drastically reduce the power and weight of these sensors. The sensors are targeted for application on the Aerosonde UAV, small tethered balloons, (untethered) radiosonde balloons and dropsondes. In Phase II, we plan to build prototypes of the candidate sensors, and flight-test them on a motor glider and on tethered balloons.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
SPEC, Inc.	Supporting Organization	Industry	Boulder, Colorado

Primary U.S. Work Locations	
Colorado	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul Lawson

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors